1,182,031

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Dental Cleaning and Massaging Device

I, LESLIE JOSEPH KOVACH, a citizen of the United States of America, residing at 880 Fifth Avenue, New York, N.Y. 10021, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to dental treating devices for cleaning the teeth and massaging the gums.

It is conventional practice to clean the oral cavity, particularly in the area of the teeth, by directing a jet of water under pressure into the oral cavity against the area to be cleaned. The water jet is applied in a continuous manner or intermittently as a periodically pulsating stream. In addition to cleaning the teeth the jet effects a massaging of the gums, particularly where a pulsating jet is employed. The jet is generally produced by connecting the nozzle by way of a water hose to a source of water under pressure, either as derived directly from an available pressurised water supply or the outlet of a motor driven pump whose inlet is connected to a water reservoir. A pump is usually employed where a pulsating jet is desired but the devices heretofore available possess many drawbacks and disadvantages. They are awkward and bulky arrangements, and are expensive and inconvenient to use.

It is, therefore, an object of the present invention to provide an improved oral cavity treating device.

According to the present invention there is provided a dental treating device comprising a hollow handle member provided with a liquid reservoir, a nozzle mounted on said handle member, a pump housed in said handle member and including an inlet connected to said reservoir and an outlet, an electric motor housed in said handle member and connected to said pump, and connecting means for selectively connecting said pump outlet to said nozzle and to said reservoir.

In a preferred form of the device, the handle member is divided by an intermediate partition into an upper reservoir-defining compartment and a lower motor-housing compartment. The pump is a piston pump including a vertical cylinder mounted on the top of the dividing partition and located in the reservoir and the motor is mounted on the bottom of the partition and is coupled to the pump piston by a rotary to reciprocating motion transmission. The pump to nozzle connecting means comprises a three-way valve including a tubular body integrally formed with the reservoir top wall and an externally manipulated valve member slidable in the body member, the valve member including a passageway for connecting the valve inlet port with a port communicating with the reservoir and a second passageway for connecting the inlet port to the nozzle, the inlet port being connected to the pump outlet. Means are provided for adjusting the opening of the second port. A longitudinal slide rod is connected to a crank pin driven by the motor and carries a tooth brush at its free end.

In the accompanying drawings:

Figure 1 is a longitudinal sectional view of a device according to the invention taken along line 1-1 in Figure 2;

Figure 2 is a sectional view taken along line 2-2 in Figure 1;

Figure 3 is a top plan view thereof;

Figure 4 is an enlarged sectional view taken along line 4-4 in Figure 1 showing the control valve in a retracted position;

Figure 5 is a sectional view taken along

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line 5-5 in Figure 4;

Figure 6 is a view similar to Figure 5, the valve being shown in the advanced position;

Figure 7 is an enlarged sectional view taken along line 7-7 in Figure 2;

Figure 8 is an enlarged sectional view taken along line 8-8 in Figure 1; and

Figure 9 is a fragmentary enlarged view of a drive coupling section for reciprocating the brush rod.

Referring to the drawings, a dental cleaning device 10 includes a hollow handle member 11 which may be conveniently held in the hand and easily manipulated. Handle member 11 comprises an upper reservoir-defining section 12 and a lower motor and transmission housing section 13 preferably of substantially cylindrical shape and having end-to-end upper and lower restricted neck sections 14 and 16 respectively.

Reservoir section 12 includes a peripheral wall 17 connected to the neck section 14 by a downwardly inclined shoulder and provided at its bottom with an integrally formed bottom partition-defining wall 18 having a central circular opening formed therein. Reservoir section 12 is closed at its top by a wall 19 suitably hermetically sealed to peripheral wall 17 and provided with a filler opening 20 surrounded by an integrally formed externally threaded peripheral collar 21 engaged by a screw cap 22. A coupling tube 23 passes through the centrally located bore in top wall 19 and is suitably secured to and projects above top wall 19 and releasably engages the trailing end 24 of a nozzle member 26 which is of known construction and terminates in a curved tip 27 having a restricted outlet opening. The base of nozzle member 26 above the trailing end 24 thereof is provided with an enlarged manipulating section 28. Projecting upwardly from partition wall 18 is a laterally offset open ended conduit 29 which is in water-tight engagement with a corresponding opening in top wall 19 and has a passage of elongated transverse cross section.

A three way valve 30 is positioned on the underface of top wall 19 and includes a radially extending tubular body member 32 integrally formed with the top wall 19 and extending from the peripheral wall 17 with which it is in watertight engagement inwardly beyond the axis of the coupling tube 23. Slidably registering with the longitudinal circular bore of valve body 32 and projecting through an aligned opening in the wall 17 is a valve member 33. The inner open end of valve body 32 defines an outlet port 34 which communicates with reservoir 12, and a circular inlet port 36 is formed in the bottom face of valve body 32 in vertical axial alignment with an outlet port 37 formed in top wall 19 in communication with valve body 32 and engaged by coupling tube 23. Inlet port 36 is surrounded by a depending coupling collar 38 integrally formed with valve body 32.

Formed in valve member 33 is a first passageway 39 having a bottom inlet and communicating with the inner end of the valve 33 whereby to communicate with the reservoir 12 through outlet port 34, the inlet opening thereof being slidable with valve member 33 into and out of registry with the inlet port 36. A second passageway 40 extends vertically diametrically through valve member 33 and trails the trailing edge of the inlet of the first passageway 39 by at least the width of inlet port 36. A bowed leaf spring 41 terminates at opposite ends in transversely projecting foot pieces 42 which slidably engage confronting guides formed in a channel-shaped track member 43 suitably secured to a face of conduit 29. The bowed section of leaf spring 41 bears against the inner end face of valve member 33 to urge it resiliently to its retracted position. Thus, passageway 39 normally affords communication between valve inlet port 36 and reservoir 12. Upon advance of valve member 33 against the pressure of spring 41 passageway 40 is brought between ports 36 and 37 to afford communication therebetween, and communication between inlet port 36 and the reservoir 12 is closed. In order to prevent the axial rotation of valve member 33 a longitudinal slot 44 is formed in the bottom wall of valve body 32 and a follower pin 46 is carried by and depends from valve member 33 and slidably engages slot 44.

The opening in passageway 40 is adjusted by means of a rod-shaped valve element 47 having a leading section registering with an axial bore formed in valve member 33 and extending rearwardly from passageway 40, the leading section of the valve element terminating in a rounded tip. An enlarged axial bore is formed in the outer end of valve member 33 and extends from the inner bore to the outer end of the valve and has rotatably nested therein a cylindrical rod 48 provided at its outer end with a finger piece or knob 49 and having a tapped axial bore 50 formed in its inner section. The trailing section of valve element 47 is threaded and engages tapped bore 50, and the inner section of valve element 47 has a longitudinal groove 51 formed therein which is engaged by a pin 52 secured to the inner face of valve member 33. Thus, rotation of the finger piece effects the advance or retraction of valve 47 and the penetration of the leading end thereof into passageway 40 whereby to permit the adjustment of the opening in said passageway.

A reciprocating pump 53 is located within reservoir 12 and includes a vertical cylinder 54 provided with a depending neck portion 56 of reduced outer cross-section delineated from the main body of the cylinder 54 by an annular shoulder. Neck 56 projects downwardly through a central opening formed in partition wall 18, and an annular gasket 57 is compressed between the cylinder shoulder and the top face of the partition wall 18 to provide a watertight seal. An outlet port 58 is formed in the top wall of cylinder 54 and has a restricted bottom opening 59 surrounded by an upwardly inclined shoulder. A ball valve 60 is positioned in port 58 and rests on the inclined shoulder and is urged into engagement with opening 59 by a helical compression spring 61 entrapped between the upper face of the ball 60 and a flange 63 suitably secured to the top face of cylinder 54. A conduit 64 extends upwardly from flange 63 into nesting engagement with valve coupling collar 38. Ball 60, opening 59 and spring 61 define a pump outlet check valve. A pump inlet check valve is positioned on a peripheral wall of cylinder 54 and includes an integrally formed cylindrical housing 65 provided with an inlet opening 66 surrounded by an inclined shoulder 67. A ball valve 68 is located in housing 65 and is urged into engagement with the peripheral edge of opening 66 by a compression spring 69 entrapped between the inner face of the ball valve 68 and an inwardly directed shoulder 70 extending from the wall of a cylindrical insert 71 which engages the inner peripheral wall of housing 65. Opening 66, ball valve 68 and spring 71 define a pump inlet check valve which affords communication between cylinder 54 and reservoir 12. A piston 72 slidably registers with cylinder 54 and is provided with a wrist pin 73 engaged by a depending piston rod 74.

Housing 13 has a peripheral recess formed in its upper inner border which tightly engages the reduced lower section of the reservoir neck portion 14 and is suitably secured thereto. A tubular transmission support frame 76 of rectangular cross-section includes horizontal upper and lower walls 77 and 78 respectively and vertical side walls 79, upper wall 77 having a circular opening formed therein which tightly engages pump cylinder neck portion 56 and is spaced from the underface of the partition wall 18 by an annular spacer 80 engaging neck 56. Wall 77 is suitably secured to neck 56 to provide a secure mounting of frame member 76 and pump 53 to the lower and upper faces of the partition wall 18 respectively. Depending from frame 76 and secured to bottom wall 78 is a vertically positioned electric drive motor 81 having a vertical drive shaft projecting above the frame bottom wall 78 and having affixed to its upper end an upwardly directed crown gear 82. Extending between and journalled to frame side walls 79 is a drive shaft 83 which projects beyond one of the side walls 79 and has affixed thereto a spur gear 84 which engages the crown gear 82. A second shaft 86 is positioned above shaft 83 and extends between and is journalled to a frame side wall 79 and a bracket plate 87 depending from the frame upper wall 77. A gear 88 is affixed to shaft 86 and engages gear 84. Secured to the inner free end of shaft 86 is a counterbalanced wheel 89 provided with an eccentric crank pin 90 which engages the lower end of piston rod 74. A second counterbalanced wheel 91 is affixed to the free end of shaft 83 along the outer face of a frame side wall 79 and is provided with an eccentric crank pin 92.

A switch 94 is mounted on the inner face of the lower peripheral wall of housing 13 and includes a switch actuating slide button 96 which registers with a longitudinal slot 97 formed in the housing peripheral wall. One terminal of switch 94 is connected to one terminal of the motor 81, the other terminal of the motor 81 and the other terminal of the switch 94 are connected to respective leads of a power cord 98 which passes through a grommet 99 registering with an opening of the peripheral wall of the housing 13 to permit the connection of the motor 81 to a source of current by way of switch 94.

A rockable guide member 100 includes a cylindrical rod 101 passing through aligned openings in conduit 29 medially positioned a short distance below top wall 19 and parallel to shaft 83. Rod 101 is provided with a head 102 at one end thereof abutting one face of conduit 29 and an annulus 103 engaging the opposite end of rod 101 and abutting the other face of conduit 29. Rod 101 is locked in assembled and freely axially rockable condition with conduit 29 by a split ring 104 engaging an annular groove 106 formed in and adjacent an end of the rod 101. An elongated slide rod 107 of smaller transverse cross-section than the bore of conduit 29 extends medially along conduit 29 and through the open ends thereof and slidably engages a mating diametrically formed bore in rocker rod 101. Rod 107 terminates at its lower end in an eye section 108 which engages crank pin 92 and is provided at its upper end in a coupling section 109. A toothbrush 110 projects laterally from coupling member 109 and includes an elongated shank 111 terminating at its free end in a separable fastening coupling adapted to releasably engage coupling member 109, the coupling member 109 and the coupling section 112 being of any suitable construction.

Considering now the operation of the device described above, reservoir 12 is charged with water W through filler opening 20 formed in top wall 19, the opening then being closed by screw cap 22. Power cord 98 is connected to a source of current and the switch 94 closed by means of button 96 to drive motor 81 which in turn reciprocates pump piston 72 by way of the gear train, crank pin 90 and piston rod 74. The reciprocating piston periodically draws water through the pump inlet check valve and periodically discharges the water through the outlet check valve into conduit 64. With three way valve member 33 in its normally retracted position, the pulses of water under pressure produced by pump 53 pass through the valve 30 back into reservoir 12. Under depression of valve 33, the pulses of water produced by pump 53 are led through valve 30 to nozzle 26 from which they emerge pulsatingly. The pulsating jet is directed against the teeth to effect the cleaning thereof and against the gums to effect the massaging thereof. The amount of water produced by the device 10 may be adjusted by turning knob 49 to decrease or increase the opening through the passageway 40 and correspondingly to decrease or to increase the amount of water delivered by the pulsating jet. Brush 110 which is vertically reciprocated by crank pin 92 through slide rod 107 may be used to brush the teeth in the usual manner.

WHAT I CLAIM IS:—

1. A dental treating device comprising a hollow handle member provided with a liquid reservoir, a nozzle mounted on said handle member, a pump housed in said handle member and including an inlet connected to said reservoir and an outlet, an electric motor housed in said handle member and connected to said pump, and connecting means for selectively connecting said pump outlet to said nozzle and to said reservoir.

2. A dental treating device according to claim 1, wherein said connecting means comprises a three-way valve including an inlet connected to said pump outlet and outlets connected to said nozzle and said reservoir and means for selectively connecting the valve outlets with said valve inlet.

3. A dental treating device according to claim 1, wherein said connecting means comprises a valve tubular body member including a first outlet port communicating with said reservoir, a second outlet port communicating with said nozzle and an inlet port communicating with the outlet of said pump, and a valve member projecting outside said handle member and slidably engaging said valve tubular body member and axially movable between an advanced and retracted position and having a first passageway connecting said inlet port and said first outlet port when said valve member is in said retracted position and a second passageway connecting said inlet port and said second outlet port when said valve member is in said advanced position, and spring means normally urging said valve member toward said retracted position.

4. A dental treating device according to claim 3, including means for adjusting the opening through said second passageway.

5. A dental treating device according to claim 3, wherein said first outlet port is defined by the inner open end of said tubular valve body member and said first passageway extends rearwardly from the inner end of said valve member and said second passageway extends transversely through a plunger.

6. The dental treating device of claim 1, wherein said handle member includes a top wall, a bottom wall and a transverse partition between said top and bottom wall dividing said hollow handle member into an upper reservoir defining compartment and a lower motor housing compartment.

7. The dental treating device of claim 6, wherein said pump is positioned in said reservoir compartment.

8. The dental treating device of claim 6, wherein said pump is a reciprocating piston pump comprising a vertical cylinder mounted on said partition, a piston registering with said cylinder, means including a first check valve providing communication between said cylinder and said reservoir and a pump outlet including a second check valve, and said connecting means comprises a three-way valve including outlets connected to said nozzle and said reservoir respectively, means affecting communication between said valve inlet and, alternatively, between said valve outlets, a conduit connecting said pump outlet and said valve inlet, and a rotary reciprocating motion translating mechanism connecting said motor to said piston.

9. The dental treating device of claim 6, including a conduit extending between said partition and said top wall and communicating with said lower compartment, a slide rod extending along and through said conduit, a rotary reciprocating motion translating mechanism connecting said motor to the lower end of said rod and a brush mounted to the upper end of said rod.

10. The dental treating device of claim 6, wherein said pump comprises a piston pump including a cylinder mounted on the top face of said partition, a piston positioned in said cylinder and exposed to said bottom compartment, and comprising a rotary reciprocating motion translating mechanism connecting said motor to said piston and mounted with said motor to the underface

of said partition.

11. A dental treating device according to claim 6, wherein said connecting means comprises a three-way valve including a valve body integrally formed with said top wall and having an inlet port connected to the output of said pump and outlet ports connected to said nozzle and said reservoir respectively, and a valve member movable in said valve body for alternatively connecting said outlet ports to said inlet port.

12. A dental treating device substantially as described with reference to the accompanying drawings.

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2 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEET 1

Fig. 1.

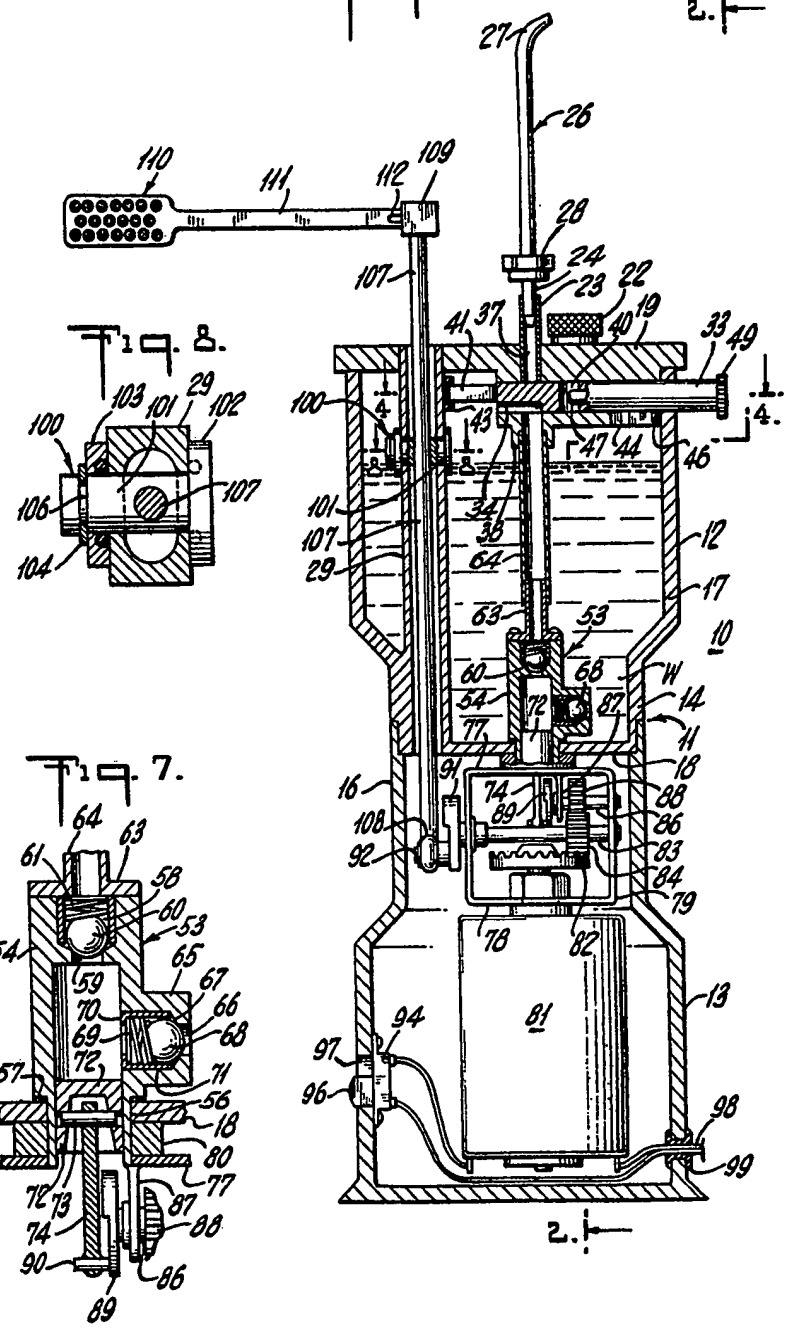

Fig. 8.

Fig. 7.

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2 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEET 2

Fig. 1.

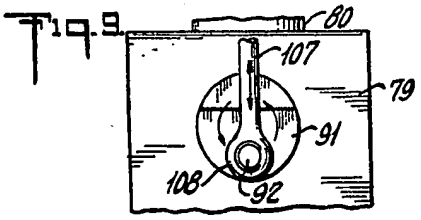

Fig. 3.

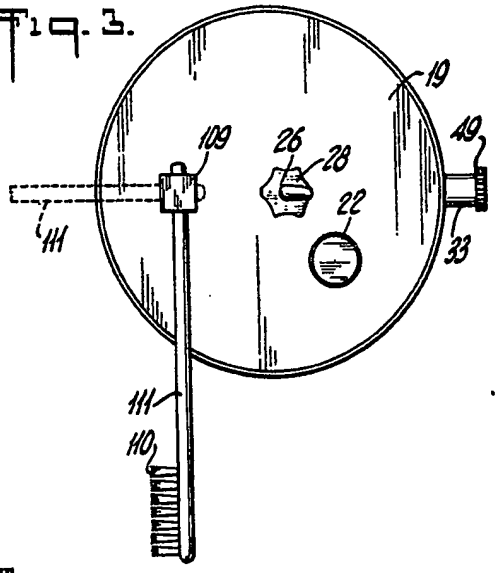

Fig. 2.

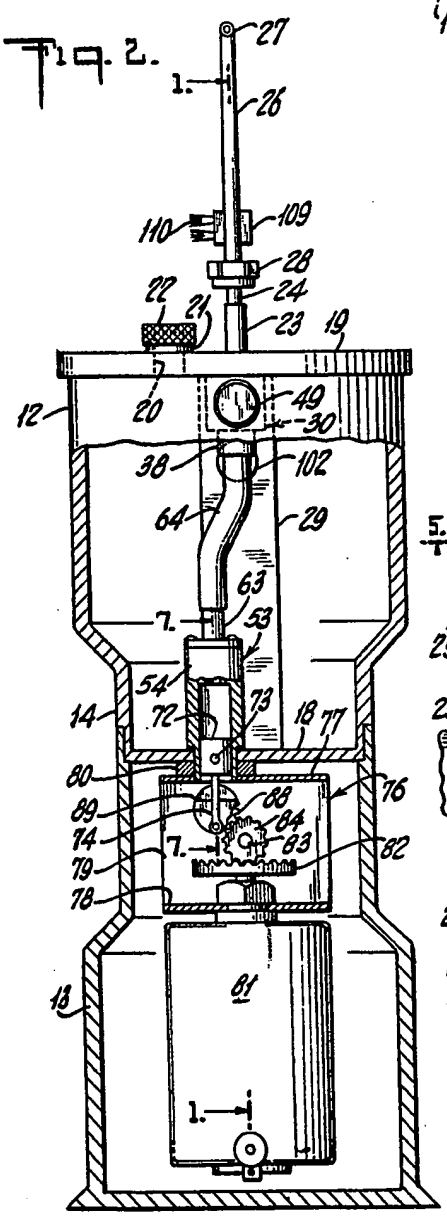

Fig. 4.

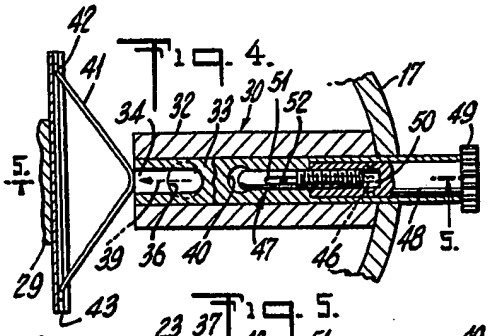

Fig. 5.

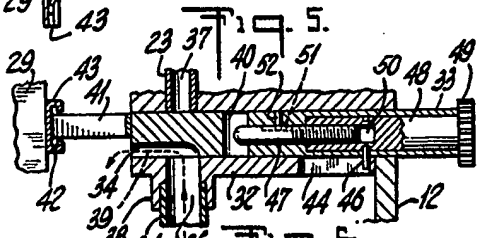

Fig. 6.